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(54) **Metal barrier film production apparatus, metal barrier film production method, metal film
production method, and metal film production apparatus**

(57) A metal film production apparatus, comprising:
a chamber accommodating a substrate having a barrier
metal film of a metal nitride formed thereon; diluent gas
supply means for supplying a diluent gas to an interior
of the chamber above a surface of the substrate; surface
treatment plasma generation means which converts an
atmosphere within the chamber into a plasma to gener-
ate a diluent gas plasma so that the barrier metal film
on the surface of the substrate is etched with the diluent
gas plasma to flatten the barrier metal film; a metallic
etched member provided in the chamber; source gas
supply means for supplying a source gas containing a

halogen to an interior of the chamber between the sub-
strate and the etched member; plasma generation
means which converts the source gas containing the
halogen into a plasma to generate a source gas plasma
so that the etched member is etched with the source gas
plasma to form a precursor from a metal component
contained in the etched member and the source gas;
and control means which makes a temperature of the
substrate lower than a temperature of the etched mem-
ber to form the metal component of the precursor as a
film on the flattened barrier metal film.

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FIG. 34

